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## Exploring Online Health Information-Seeking Behaviours among Older Adults in Rural Areas

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**Abstract.** Little is known about use of internet and online health information seeking behaviours of older adults who live in rural area. This study explored technology use, online health information-seeking behaviours among older adults in rural areas, and then identified differences of technology use and online health information seeking behaviours between urban and rural areas. Secondary data from Pew Research Institute's Information Engaged and Wary Survey data were used. In this study, 775 participants aged 65 or older were included in the data analysis. To determine differences in health information seeking behaviours among older adults between urban and rural areas, first chi-square test and Fisher's exact test were used to assess differences in demographic variables between older adults in urban and rural areas, and then *t*-tests were used to determine any differences regarding use of Internet and online information-seeking behaviours between urban and rural areas. Older adults in rural communities used the Internet and email slightly less than older adults in urban areas. Older adults in rural areas needed much more help finding the information they need online compared to urban older adults. Based on the results, appropriate or individualized supports should be provided to older adults, especially those in rural areas, to help them obtain reliable online health information to support better decisions about their health.

**Keywords.** Online Health Information-Seeking Behaviours, Older Adults, Rural Areas

### 1. Introduction

As Americans live longer, the growth in the number of older adults is unprecedented. In 2019, 16% (5.4 million) of the US population was aged 65 or older, but this number is projected to reach 23.5% (98 million) by 2060 [1]. Older adults are a unique population group in that their physical, cognitive, and social characteristics are different from other age groups [2]. Older adults encounter a number of chronic health problems such as hypertension, diabetes, and heart disease and decline in cognitive and physical functions [3, 4]. Especially, older adults in rural area have higher prevalence of chronic health problems, higher rates of disability, and lower rate of health behaviours [5]. Older adults living in rural communities need health care service at higher rates but they are at disadvantage of access to available health care service, resources, and they has unmet needs [6]. The reasons unmet needs are unclear in the literature and lack of evidence [7]. It is important to understand unmet needs and explore health information-seeking behaviours (HISB) among older adults in rural communities.

HISB is viewed as active behaviours to fulfil information needs to cope with a health-threatening situation [8]. HISB has become a significant part of daily living because it promotes health-protective behaviours and supports health-related decision-making [7, 9]. For older adults, HISB has become an essential part of their later life regarding healthy aging [10]. Healthy aging refers to how “adapt[action] of health habits and behaviour, staying involved in ... [and] managing health conditions ... can contribute to a productive and meaningful life” [11] . As the definition implies, healthy aging is not limited to active engagement in well-being but also includes behaviours that contribute to a productive and meaningful life among older adults. HISB is an enabling factor that contributes to healthy aging [12]. Older adults identified that needs for information regarding their specific health conditions and wellness to keep healthier lifestyles [13].

Information and communication technologies provide new means to search for health information among older adults to assume a more pronounced role in managing their own health and health related decision-making. However, while more seniors are using the internet to search for health information, there are still significant barriers and difficulties in conducting searches that prevent seniors from successfully interpreting and using the information found [14]. For instance, older adults with lower electronic health (eHealth) literacy experience more difficulty searching for and accessing health information [15-17]. Other barriers include physical health limitations, cognitive limitations, health literacy, and negative attitudes toward technology [14]. Rural communities face additional obstacles and challenges in their internet use, technology adoption, and access to online information [18-20]. Many studies focused on disparities in online HISB according to socioeconomic variables such as gender, age, education level, income level, etc [21-25]. It is important to understand older adults’ online HISB in rural communities to provide better support for accurate health information searching and use of online health information. Understanding the needs of both groups regarding Internet use and online HISB pattern is crucial to designing interventions aimed at improving online HISB and positively influencing decision-making about their health issues.

The purposes of this study were to identify technology use, online health information-seeking behaviours among older adults in rural communities, and then identified differences of technology use and online health information seeking behaviours between urban and rural areas

Figure1. Conceptual model: Online health information seeking behaviours

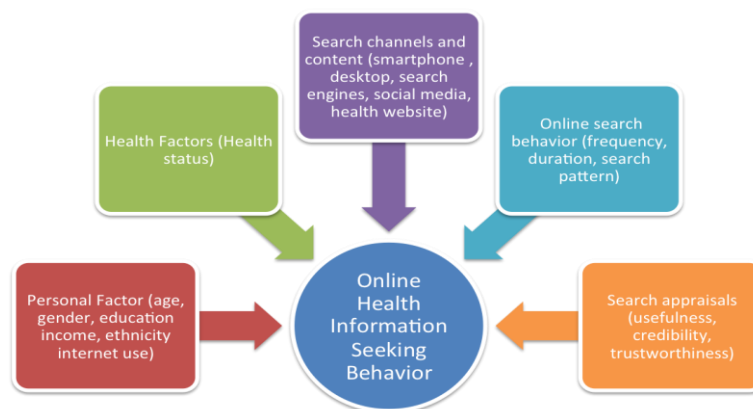


Figure 1 shows the conceptual model for this study. It consists of five categories to influence online health information seeking behaviours. The five categories include personal

demographic factor, individual health status, search channels such as smartphone vs desktop, frequency and duration of internet, and search appraisals.

## **2. Methods**

### **B. 1 Data Collection**

Secondary data from the Information Engaged and Wary Survey conducted by Pew Research Centre Internet, Science, & Technology project were used. This survey was conducted in English or Spanish via telephone interviews (landline:  $n = 757$ ; cell phone:  $n = 2,258$ ) with a nationally representative sample of 3,015 adults, aged 18 or older, living in the United States. Weighting was used in survey analysis to compensate for sample designs and patterns of nonresponse that might bias results. The sample was weighted to match national general adult population parameters. To derive weights, a two-stage weighting procedure was used: (a) the first stage corrected for different probabilities of selection associated with the number of adults in each household and each respondent's internet use patterns, and (b) the second stage balanced sample demographics based on population parameters. Weights were trimmed to prevent individual interviews from having too much influence on the results. In this study, only 775 participants aged 65 or older were included. The original survey data were primarily collected to describe the public's internet use and HISB. In this detailed secondary analysis, we compared internet use and HISB of older adults in rural and urban areas.

### **B. 2. Data Analysis**

Data analysis included demographic variables (age, gender, race, education, income, marital status, internet use, and types of device use, e.g., smartphone, Kindle e-reader, iPad, tablet computer, desktop computer, or laptop computer) and HISB (types of information used to make decisions, use of public library in person or websites). To determine differences in HISB among older adults between urban and rural areas, first chi-square tests were conducted to control demographic variables, and then  $t$ -tests were used to compare the two groups based on internet use and HISB, including public library use. Count and percentage results are presented for categorical variables, including age group (65–74, 75–84, and 85+ years), gender, race, education, income, marital status, area of birth, and HISB Means and standard deviations are shown for age. Chi-square tests and Fisher's exact tests were used to test differences in categorical variables between older adults in city and rural areas.  $T$ -tests were used to test mean differences between the two groups. SAS software version 9.4 was used for all statistical analyses. A  $p$ -value  $< .05$  was considered statistically significant.

## **3. Results**

This study compared older adults' internet use and HISB in urban and rural areas, controlled by age, gender, race, education, income, marital status, and area of birth. Our final sample featured 775 participants aged 65 or older, of whom 577 participants lived in urban areas and 192 participants lived in rural areas. No difference was found at baseline in sample characteristics (age, gender, education, income, and marital status) between older adults living in urban and rural areas (see Table 1). Of the three age groups, more than half of participants were in the youngest group (65 to 74) in both urban ( $n = 534, 61.4%$ ) and rural ( $n = 112, 58.3%$ ) areas, with a mean age of 74 in both areas.

More participants were male (urban:  $n = 324, 56.2%$ ; rural:  $n = 105, 55.2%$ ) and White (urban:  $n = 487, 84.4%$ ; rural:  $n = 140, 88.5%$ ) in both groups. Education level in both areas was similar. The majority had earned a college degree (urban:  $n = 281, 48.7%$ ; rural:  $n = 81, 42.2%$ ), followed by a degree lower than college (urban:  $n = 185, 32.1%$ ; rural:  $n = 69, 35.9%$ )

and higher than college (urban:  $n = 107$ , 18.5%; rural:  $n = 38$ , 19.8%). One third of participants in both areas had an annual income between \$30,000 and \$75,000. More than half of participants were married and living with a partner (urban:  $n = 307$ , 53.2%; rural:  $n = 118$ , 61.5%), followed by divorced, separated, or widowed; there was no difference between urban or rural areas.

Table 1. Distribution of demographic characteristics

	Urban N=577		Rural N=192		P-value
	n	%	n	%	
Age, year					0.73
65-74	354	61.4	112	58.3	
75-84	149	25.8	52	27.1	
85+	74	12.8	28	14.6	
Mean (SD)	74.3	(8.57)	74.8	(8.97)	0.52 <sup>††</sup>
Gender					0.82
Female	253	43.9	86	44.8	
Male	324	56.2	106	55.2	
Race					0.29
White	487	84.4	170	88.5	
Black	45	7.80	9	4.69	
Other	45	7.80	13	6.77	
Education					0.18 <sup>†</sup>
Lower than College	185	32.1	69	35.9	
College	281	48.7	81	42.2	
Higher than college	107	18.5	38	19.8	
Unknown	4	0.69	4	2.08	
Income					0.67
<30000	143	24.8	44	22.9	
30000-74999	178	30.9	65	33.9	
>=75000	151	26.2	44	22.9	
Unknown	105	18.2	39	20.3	
Marital status					0.17 <sup>†</sup>
Marry / live with a partner	307	53.2	118	61.5	
Divorce / separated / widowed	236	40.9	63	32.8	
Never been marry	28	4.85	8	4.17	
Unknown	6	1.04	3	1.56	

Chi-square test, <sup>†</sup>Fisher's exact test, and <sup>††</sup>t-test

In Table 2, we compare internet use and HISB including use of a public library between older adults living in urban and rural areas. Regarding internet use in both groups, there was no statically significant difference at  $p < .05$ . Most participants used the internet or email (urban:  $n = 435$ , 75.4%; rural:  $n = 133$ , 69.3%) and accessed the internet on their cell phone or other mobile device (urban:  $n = 373$ , 64.6%; rural:  $n = 107$ , 55.7%) in both groups. However, older adults in rural areas were slightly less likely to use the internet or email or access the internet on their cell phone than older adults in urban areas. Almost one third of participants had a cell phone (urban: 36.6%; rural: 40%) or smartphone (urban: 27.7%; rural: 27.1%). Almost half of participants used social media (urban: 44.9%; rural: 41.7%) or used devices such as a tablet

computer (urban: 41.9%; rural: 36.5%) or a desktop or laptop computer (urban: 71.8%; rural: 71.4%) in both groups.

Table 2 Use of Internet and Use of Digital Devices

	Urban		Rural		p- vare
	n	%	n	%	
Do you use the internet or email, at least occasionally					0.16
Yes	435	75.4	133	69.3	
No	141	24.4	59	30.7	
Unknown	1	0.17	0	0.00	
Do you access the internet on a cell phone, tablet or other mobile handheld device, at least occasionally?					0.06
Yes	373	64.6	107	55.7	
No	202	35.0	85	44.3	
Unknown	2	0.35	0	0.00	
Do you ever use the internet or email at HOME?					0.18
Yes	425	73.7	131	68.2	
No	33	5.72	9	4.69	
Unknown/missing	119	20.6	52	27.1	
Next, do you have a cell phone, or not?					0.57
Yes	211	36.6	77	40.1	
No	54	9.36	14	7.29	
Unknown/missing	312	54.1	101	52.6	
Is your cell phone a smartphone, or not?					0.67
Yes, smartphone	160	27.7	52	27.1	
No, not a smartphone	98	17.0	38	19.8	
Unknown/missing	319	55.3	102	53.1	
Do you ever use social media sites like Facebook, Twitter or LinkedIn?					0.19
Use social media	359	44.9	80	41.7	
No	198	34.3	60	31.3	
Unknown	120	20.8	52	27.1	
Do you have a handheld device made primarily for e-book reading, such as a Nook or Kindle e-reader but NOT the Amazon Fire					0.14
Yes	145	25.1	37	19.3	
No	431	74.7	154	80.2	
Unknown	1	0.17	1	0.52	
Do you have a tablet computer like an iPad, Samsung Galaxy Tab, Microsoft Surface Pro, or Amazon Fire					0.40

Yes	242	41.9	70	36.5	
No	334	57.9	122	63.5	
Unknown	1	0.17	0	0.00	
DEVICE1d. Do you have a desktop or laptop computer					0.35
Yes	414	71.8	137	71.4	
No	163	28.3	54	28.1	
Unknown	0	0.00	1	0.52	

Table 3 indicates a statistically significant need for help finding information online ( $p = .04$ ). Older adults in urban areas needed less help finding information they need online compared to older adults in rural areas. Older adults in urban settings ( $n = 210, 36.4\%$ ) reported needing help finding the information they need online less often compared to rural older adults ( $n = 63, 32.8\%$ ); other participants reported occasionally needing some help (urban:  $n = 198, 34.3\%$ ; rural:  $n = 52, 27.1\%$ ) or frequently needing help (urban:  $n = 46, 7.9\%$ ; rural:  $n = 24, 12.5\%$ ). Regarding how much participants trusted the information sources to guide their decision making, there was no statistically significant difference between urban and rural participants. However, older adults in urban areas were much more likely to trust information from national news organizations ( $n = 364, 63.1\%$ ) than their rural counterparts ( $n = 109, 56.8\%$ ) and had less in trust social media such as Facebook, Twitter, or Instagram (urban:  $n = 182, 31.5\%$ ; rural:  $n = 54, 28.1\%$ ). A majority in both group trusted information from family and friends a lot (urban:  $n = 471, 81.6\%$ ; rural:  $n = 158, 82.3\%$ ). Differences were statistically significant regarding trust in information from local news organizations (urban:  $n = 402, 69.7\%$ ; rural:  $n = 114, 59.4\%$ ;  $p = .02$ ), government sources (urban:  $n = 312, 54.1\%$ ; rural:  $n = 81, 42.2\%$ ;  $p = .005$ ), and health care providers (urban:  $n = 495, 85.8\%$ ; rural:  $n = 147, 76.7\%$ ;  $p < .001$ ). Regarding use of a library, there was no statistically difference between the two groups. Almost half of participants in both groups visited a public library and used a public bookmobile in person (urban:  $n = 257, 44.5\%$ ; rural:  $n = 88, 45.8\%$ ), and a majority of both groups never used a public library website (urban:  $n = 380, 65.9\%$ ; rural:  $n = 140, 72.9\%$ ) or a public library app (urban:  $n = 504, 87.4\%$ ; rural:  $n = 178, 92.7\%$ ).

Table 3. Needs help to find health information online/ Information seeking behaviours

	Urban		Rural		p-value
	n	%	n	%	
Which of the following statements comes closest to describing you?					<b>0.04*</b>
I do not often need help finding the information I need online	210	36.4	63	32.8	
I could occasionally use some help finding the information I need online	198	34.3	52	27.1	
I frequently need help finding the information I need online	46	7.97	24	12.5	
Unknown	123	21.3	53	27.6	

How much do you trust the following information sources when it comes to making decisions?

Information from national news organizations					0.11
A lot /Some	364	63.1	109	56.8	
Not too much /Not at all	208	36.1	83	43.2	
Unknown	5	0.87	0	0.00	
Information you see on social media, such as Facebook, Twitter or Instagram					0.66
A lot /Some	74	12.8	25	13.0	
Not too much /Not at all	182	31.5	54	28.1	
Unknown	321	55.6	113	58.9	
Information you get from family and friends					0.96
A lot /Some	471	81.6	158	82.3	
Not too much /Not at all	103	17.9	33	17.2	
Unknown	3	0.52	1	0.52	
Information you can get from the local public library or librarians					0.27
A lot /Some	392	67.9	129	67.1	
Not too much /Not at all	163	28.3	60	31.3	
Unknown	22	3.81	3	1.56	
Information from local news organizations					<b>0.02*</b>
A lot /Some	402	69.7	114	59.4	
Not too much /Not at all	170	29.5	77	40.1	
Unknown	5	0.87	1	0.52	
Information from government sources					<b>0.005*</b>
A lot /Some	312	54.1	81	42.2	
Not too much /Not at all	260	45.1	111	57.8	
Unknown	5	0.87	0	0.00	
Information from health care providers					<b>0.001*</b>
A lot /Some	495	85.8	147	76.6	
Not too much /Not at all	81	14.0	41	21.4	
Unknown	1	0.17	4	2.08	
Information from financial institutions					0.67
A lot /Some	371	64.3	117	60.9	
Not too much /Not at all	203	35.2	74	38.5	
Unknown	3	0.52	1	0.52	
<b>Use of library</b>	<b>n</b>	<b>%</b>	<b>n</b>	<b>%</b>	<b>p-value</b>
Have you done this in the past 12 months?					
Visited a public library or used a public library bookmobile IN PERSON					0.06
Yes, have done this in past 12 months	257	44.5	88	45.8	
Yes, have done this, but not in the past 12 months	236	40.9	64	33.3	
No, have never done this	84	14.6	40	20.8	
Used a public library WEBSITE					0.12

Yes, have done this in past 12 months	118	20.5	37	19.3	
Yes, have done this, but not in the past 12 months	78	13.5	15	7.81	
No, have never done this	380	65.9	140	72.9	
Unknown	1	0.17	0	0.00	
Used a public library mobile APP					0.23
Yes, have done this in past 12 months	45	7.80	10	5.21	
Yes, have done this, but not in the past 12 months	24	4.16	4	2.08	
No, have never done this	504	87.4	178	92.7	
Unknown	4	0.69	0	0.00	
<hr/>					
Have you used a cell phone, e-reader or tablet computer to visit a public library's website or access public library resources in the past 12 months?					0.94
Yes	60	10.4	19	9.90	
No	58	10.1	18	9.38	
Unknown/missing	459	79.6	155	80.7	
<hr/>					
Do you think the public library helps you?					
Find information that is trustworthy and reliable					0.27
Yes	424	73.5	133	69.3	
No	140	24.3	51	26.6	
Unknown/missing	13	2.25	8	4.17	

Chi-square test, Fisher's exact test; \* p-value <.05

#### D. Discussion

This study explored older adults' use of digital devices, use of the internet, and HISB. In addition, these factors, including use of a public library, were compared between older adults in urban and rural areas.

In terms of internet use, there was no statically significant difference between the two groups; around 70% of participants used either the internet or email. This result aligns with the trend that internet adoption among older adults has risen steadily during the last decade and a half, from 14% in 2000 to 67% in 2016 [26]. One third of adults aged 65 or older said they never use the internet [27]. And they still use the internet less for different activities such as email and web-based shopping compared to young people [18, 28]. One factor that possibly contributes to their lower internet use compared to their younger counterpart is a decline in vision and fine motor coordination, which causes hesitation about using devices such as a computer mouse [29].

Older adults are a heterogeneous group regarding technology use and are characterized by diverse prior employment experiences, motivations for using technology, and computing knowledge [31, 31]. The findings of this study show that geographical setting can contribute to heterogeneity in their technology adoption. Older adults in rural areas are slightly less likely to use the internet or email or to access the internet on a cell phone than their counterparts in urban areas. Another study also found that older adults in rural communities use the Internet less than their urban counterparts [20]. It means that older residents in rural communities are more likely to be at risk of social isolation, caregiver burden, and lack of access to health care and other resources. Technology can benefit older rural residents, but many do not use technology [20].

Regarding the use of digital devices, almost 40% of participants had cell phone in both groups, but only 27% of participants used a smartphone. Interestingly, almost 40% of participants used social media (Facebook, Twitter, or LinkedIn) in both areas, whereas 40% of older adults did not have basic digital skills to use social media [27]. Most participants (70%) had a desktop or laptop computer, and 40% had a tablet computer such as an iPad or Samsung Galaxy Tab in both groups. In terms of needing help finding information online, older adults in urban areas needed less help compared to older adults in rural areas. According to Field [27], of rural residents who use the internet, nearly half say they need someone else's help to set up or use a new digital device. Many factors, including demographics, influence online HISB. Studies found that gender, age, education, and income are significant factors associated with online HISB in Ghana [32, 33]. Nangsangna and Vroom [32] also showed that computer and internet experience factors increased the probability of using the internet to seek health information. eHealth literacy (ability to find online health information, critique information, and apply it to make a health decision) may influence to online information-seeking behaviours. A study [34] identified younger age, better self-rated health, more frequent internet use, more frequent online health information seeking, and more types of health information sought as significant predictors of higher eHealth literacy. Many research findings indicate that well-educated people who live in an urban area are more likely to use the internet for health-related information than those who are less educated and live in a rural area [35-37]. Regarding how much older adults trusted the information sources when making a decision, there was no statistically significant difference between urban and rural participants in this study. However, older adults in urban areas were much more likely to trust information from national news organizations than rural older adults and had less trust in social media such as Facebook, Twitter, or Instagram. However, a majority in both groups trusted information from family and friends a lot, followed by information from health care providers. Several previous studies reached similar conclusions. A study found that older adults reported the most reliable health information comes from health care providers, whereas they had the lowest trust in television and the radio [12, 32, 38]. Regarding use of a library, there was no statistically significant difference between the two groups.

In sum, although use of online health information can play a key role in effectively manage older adults' health and also help in health-related decision-making, older rural residents may have more challenges in benefitting from online health information. This indicates that heavy reliance on online health information may increase the health disparities among older adults. Thus, there is a need for interventions and efforts focusing on developing ways to reduce this health disparity and to easily access online health information targeted at older adults in rural areas.

### **Limitations**

Limitations of this study include the focus on urban and rural areas as a defining factor related to internet use and HISB. However, there were no statistically significant differences between the two groups except regarding some content of the information that older adults seek. In addition, secondary data were used for this study, and some variables were unavailable. Further research should include other variables such as eHealth literacy and technical skills to better explain older adults' online HISB.

### **E. Conclusion**

This study examined older adults' internet use, HISB, and differences regarding internet use and HISB between urban and rural areas. Older adults in rural areas were slightly less likely to

use the internet and email and to access the Internet on cell phone than older adults in urban areas. Older adults in rural areas needed more help finding information online compared to their counterparts in urban areas. It means that appropriate education on use of the internet should be needed for rural older residents, particularly to find online health information, thus equipping them with the ability to find reliable online health information to make health decisions.

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